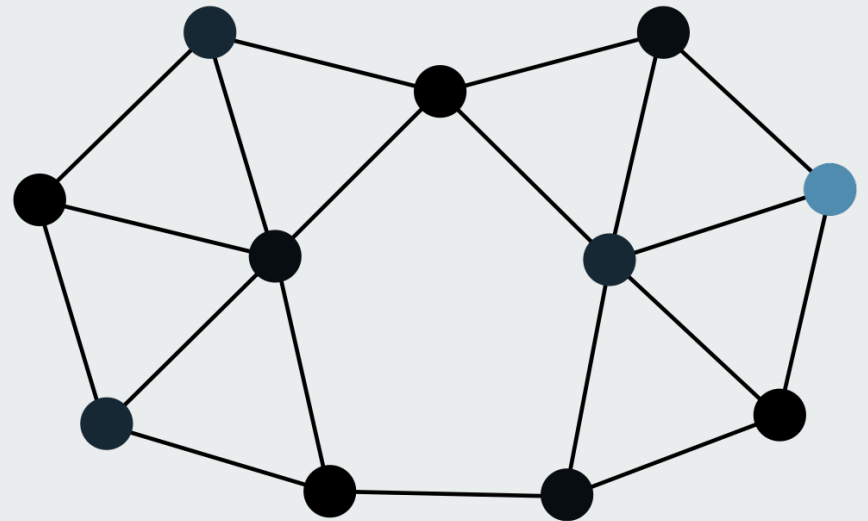


# Distributed Systems

Introduction



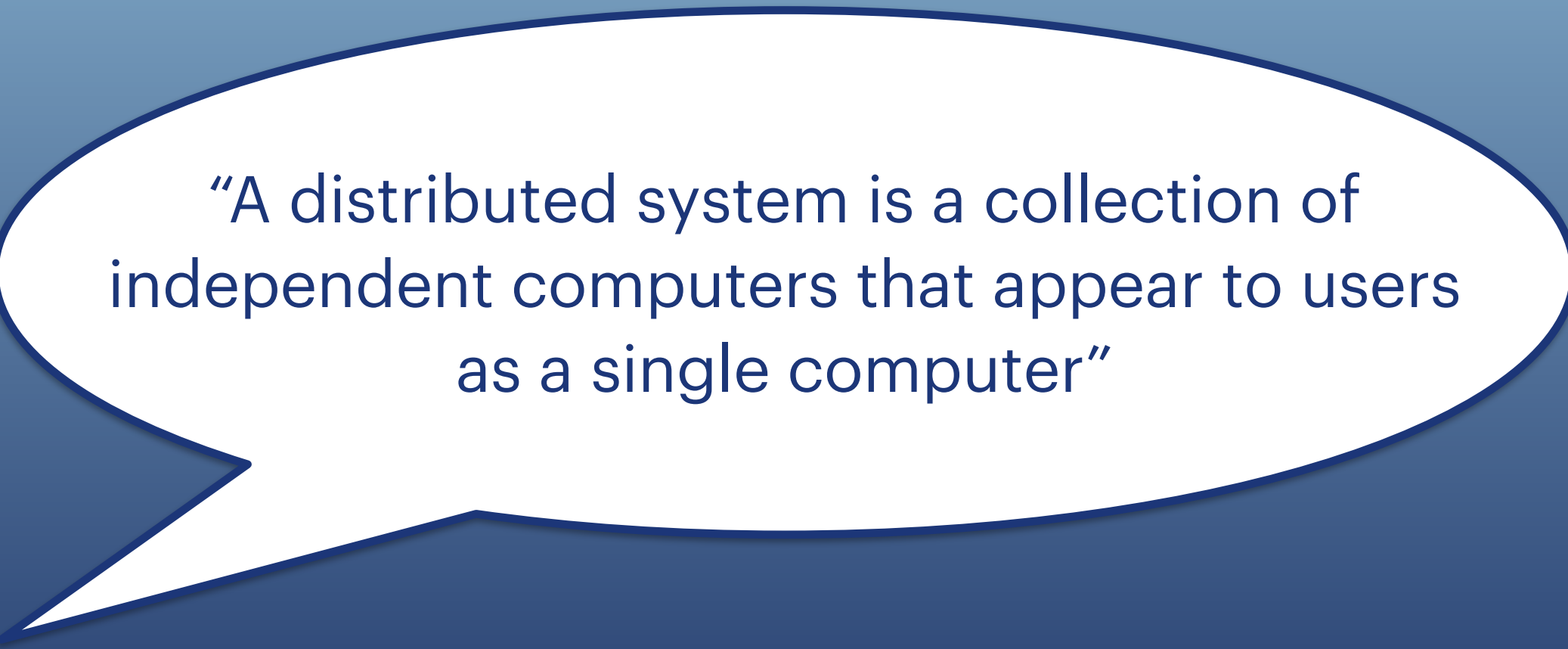


# What is this course about?

Module descriptor:

- “The aim of this module is to give the learner a clear overview of the challenges and design goals of distributed systems.”

# What is a distributed system?



“A distributed system is a collection of independent computers that appear to users as a single computer”



## We will cover..

- Designing distributed systems.
- Systems with three or more nodes working together on a single task
- Making the system look like a single machine.
- Efficiently programming for these architectures.
- Different arrangements/models.
- Communication and synchronisation.
- System safety, coordination, and performance.
- Failure handling.



# Why learn this?

- ▶ Different model of computation
- ▶ Non-distributed systems have limits
- ▶ Part of everyday life (*The Internet*)
- ▶ Important

**What you need to do**



# Module Organisation

## Lectures & Labs:

- Timeslot: *See Timetable on Moodle*
- Session will be a mixture of lectures and labs so please bring your laptop to all sessions.
- Most sessions will be recorded and posted on Moodle

**Lecturer:** Jennifer Lebron  
[jennifer.lebron@griffith.ie](mailto:jennifer.lebron@griffith.ie)

- Include:**
- Module name/code
  - Name
  - Student Number
  - Issue



# Lecture Delivery

- Format: Online/on Campus
  - Zoom link posted on Moodle
  - Online etiquette
  - Follow SOPs
  - Questions: wait to be called on, post in chat
- Attendance will be taken
- Recordings and notes will be posted online



# Lecture Structure

## Format:

- ➔ Review on Previous Topics
- ➔ New Theory
- ➔ Lab work / Assignments

## Style:

- Interaction
- Questions: ready, aim, fire
  - Answer badly -> improve over time
  - There is no right answer





# Absences/Extensions

- Documentary support is required for any explanation in relation to absence from or extensions for class tests or assessments.
- Documentation must be supplied to faculty office in a timely manner.
- Form available on topic 6 on the [Computing-Student Info-Dublin page on Moodle](#)



# Assessment

40% - Continuous Assessment → 3 Assignments

60% - Exam

Required to pass both components in order to pass the module.



# Continuous Assessment

- All of your assignments will be programmed in C++
- Similar to Java, however you will have to manage your own memory now.
- You will be using the MPI (Message Passing Interconnect) API
- You will take advantage of multiple processors to accelerate certain tasks.



# Exam

- 3 hours duration
- 5 questions, answer 4

## Tips:

- ▶ Write answers in your own words. Regurgitating the notes verbatim implies a lack of understanding.
- ▶ Answer the question that is asked. Answering more than needed looks like guess work.
- ▶ Write a neat answer sheet. Don't make it hard to correct, you'll get less marks.



# Labs

Don't copy/paste programs, you will learn nothing.

Each example represents a single concept. Work through them in order.

First two/three weeks:

- Getting familiar with C++ and OpenMPI
- Getting used to the toolchain – installation, compilation, basic makefiles...

If you don't know C++/MPI - feel free to ask

Exercises/Questions/Challenges

# Tools you will need

At the very minimum you will require:

- ✓ a text editor/IDE
- ✓ a terminal
- ✓ a C++ compiler
- ✓ an installation of the MPI libraries



Use the installation instructions for your specific OS, posted on Moodle

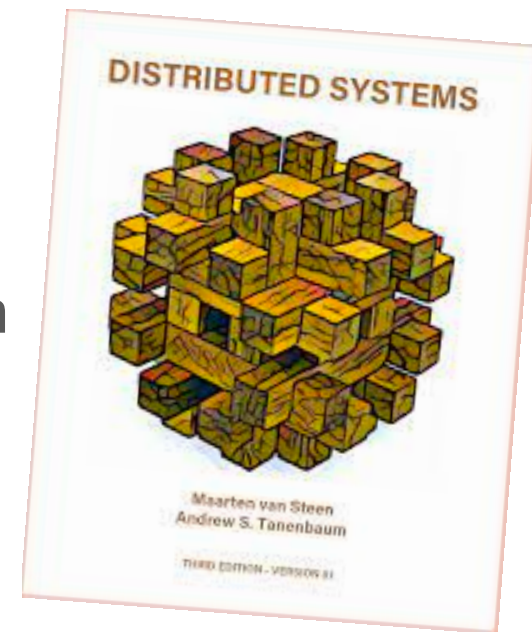
# Recommended Reading

Notes based on:

“Distributed Systems: Principles and Paradigms”

By Andrew Tanenbaum and Maarten Van Steen

ISBN-13: 978-1292025520



Available on kindle and GCD Library

<https://books.griffith.ie/cgi-bin/koha/opac-detail.pl?>

[biblionumber=33407&query\\_desc=kw%2Cwrdl%3A%20distributed%20systems%20principles%20andrew%20tanenbaum](https://books.griffith.ie/cgi-bin/koha/opac-detail.pl?biblionumber=33407&query_desc=kw%2Cwrdl%3A%20distributed%20systems%20principles%20andrew%20tanenbaum)